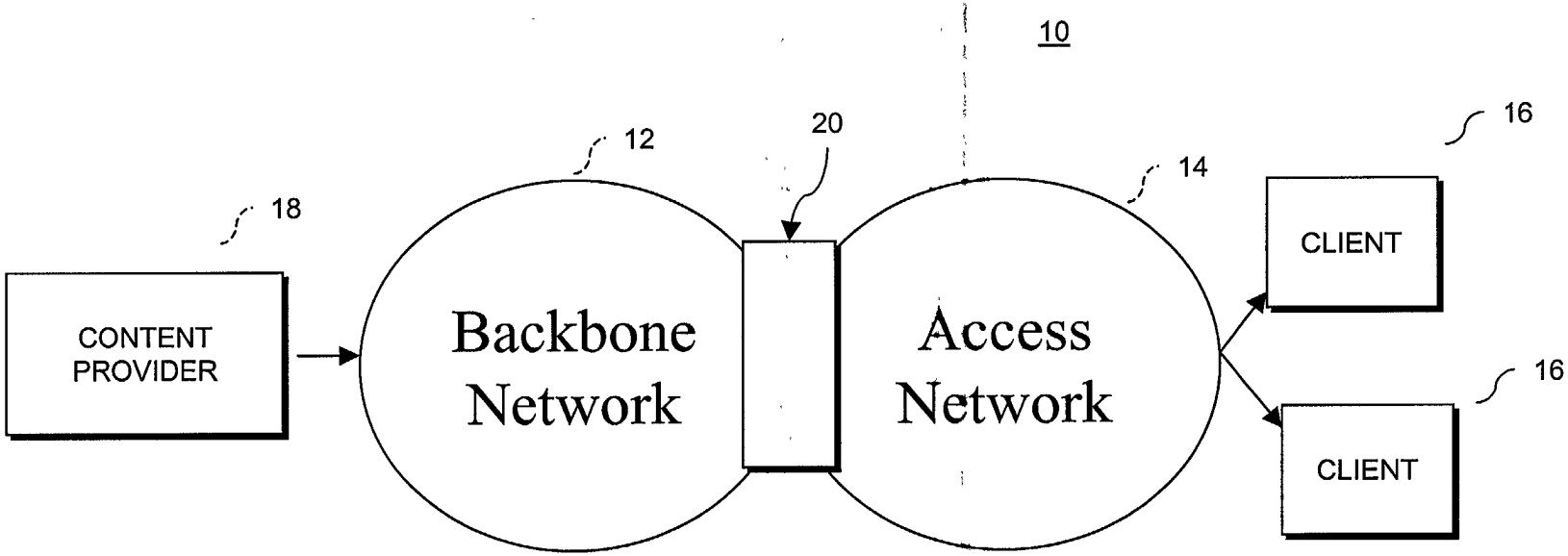

FIG. 1 – Data Network with Edge Server

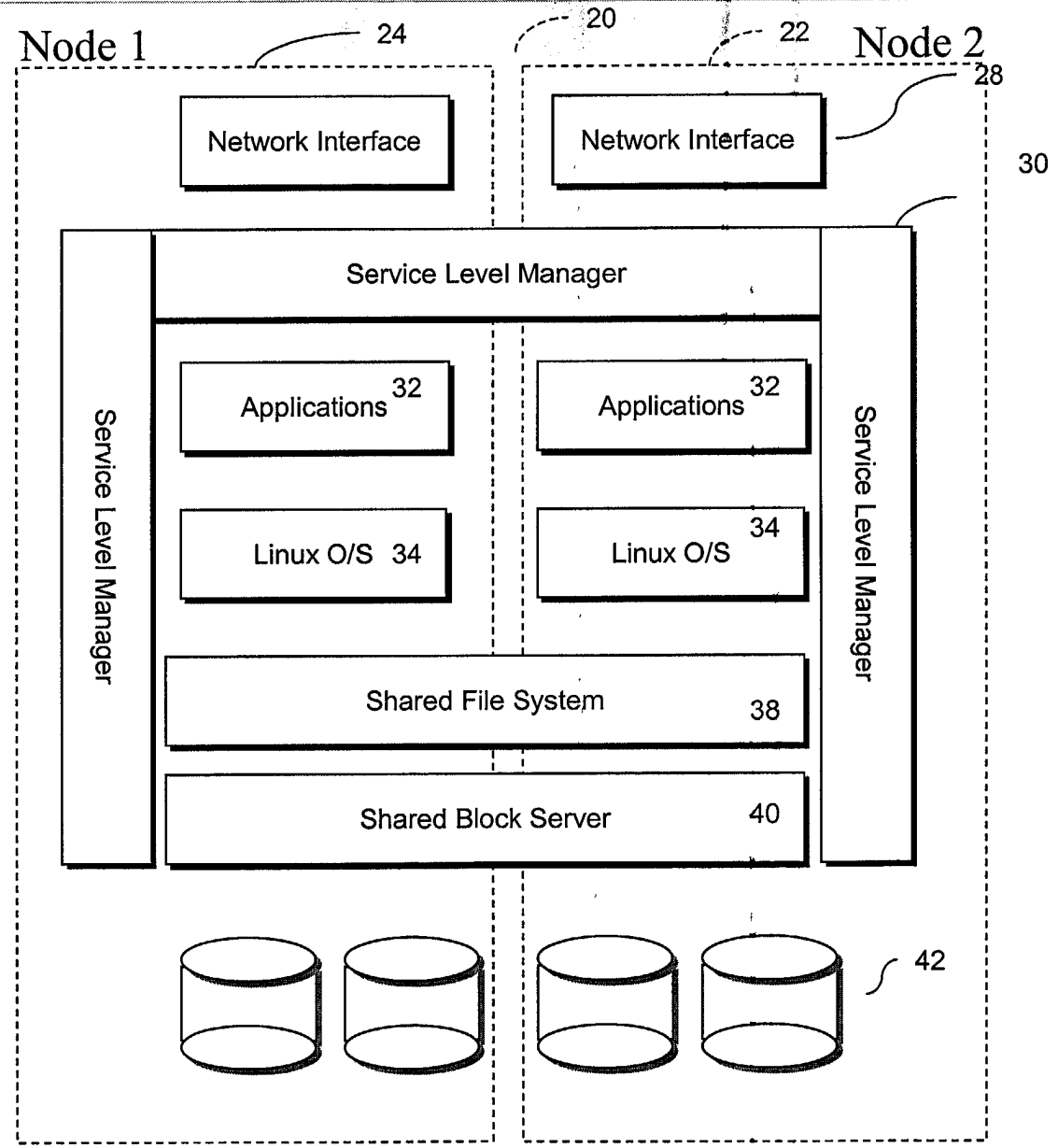

FIG. 2 – Service-Level Controlled Server

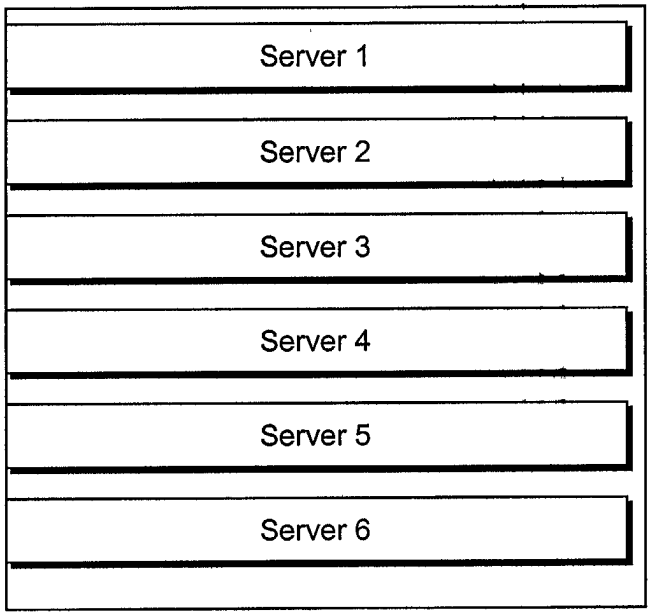

FIG 3 – Six Node Cluster

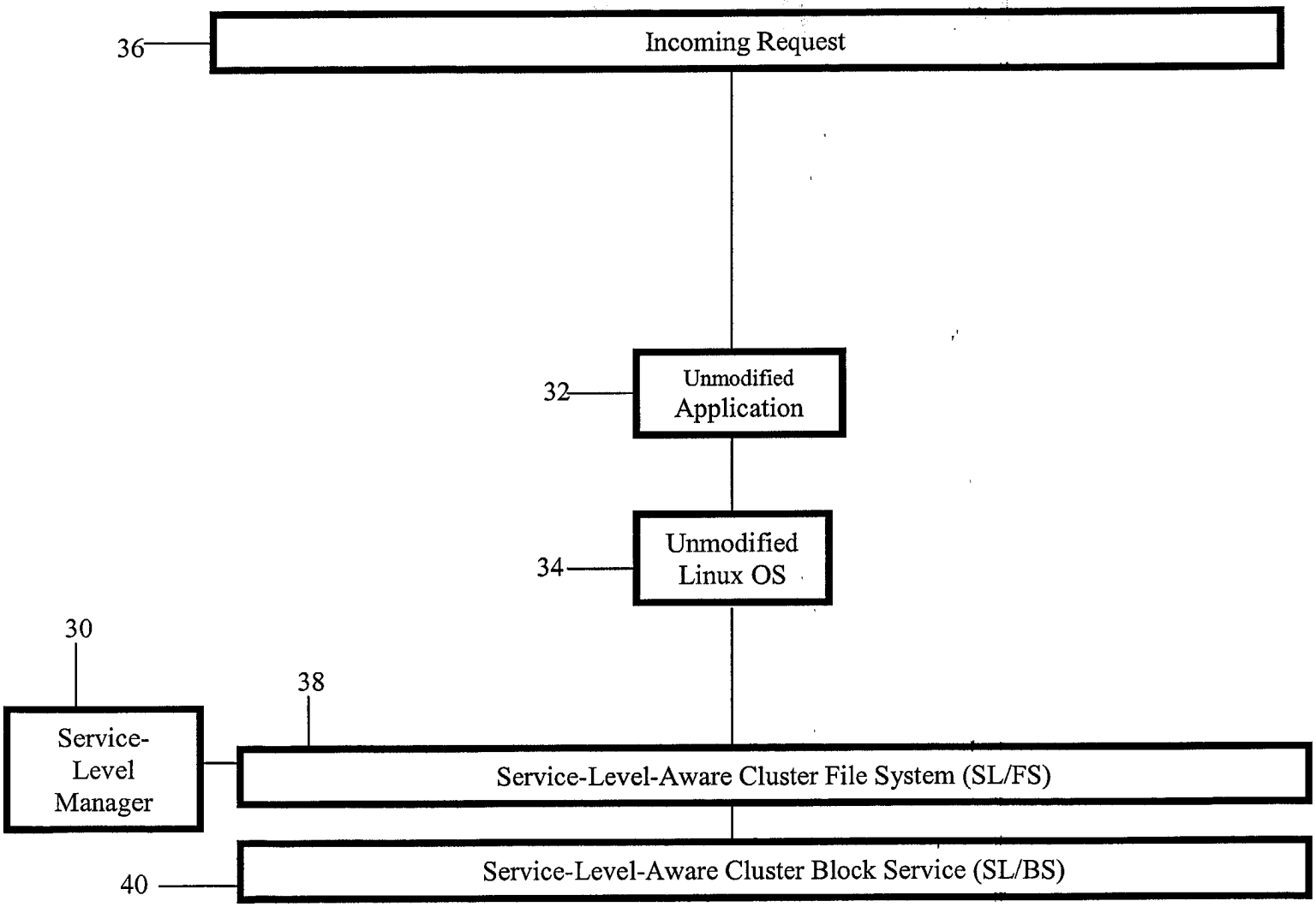

Fig. 4 – Service-Level Flow for Unmodified Applications

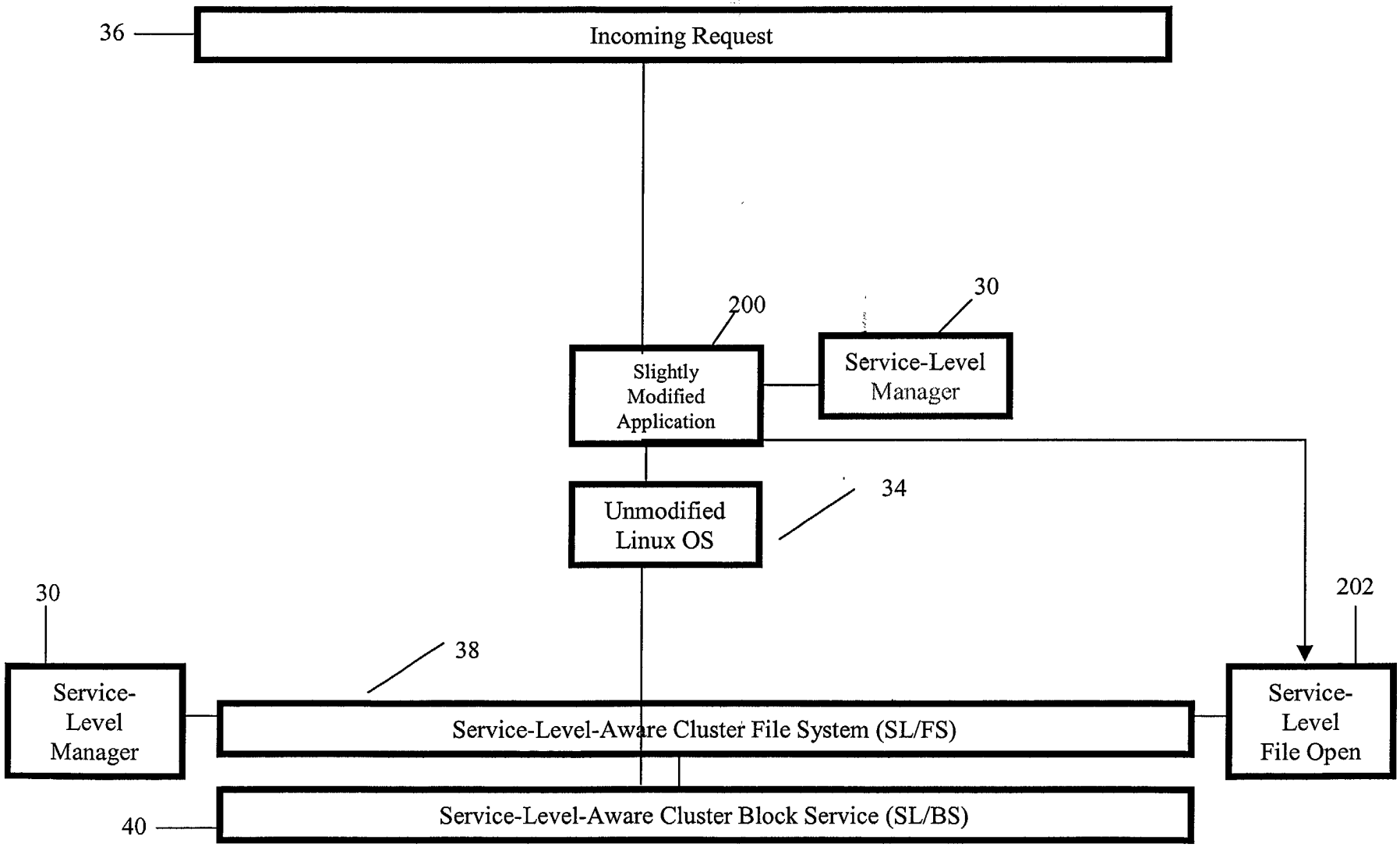

Fig. 5 – Service-Level Flow for Modified Applications

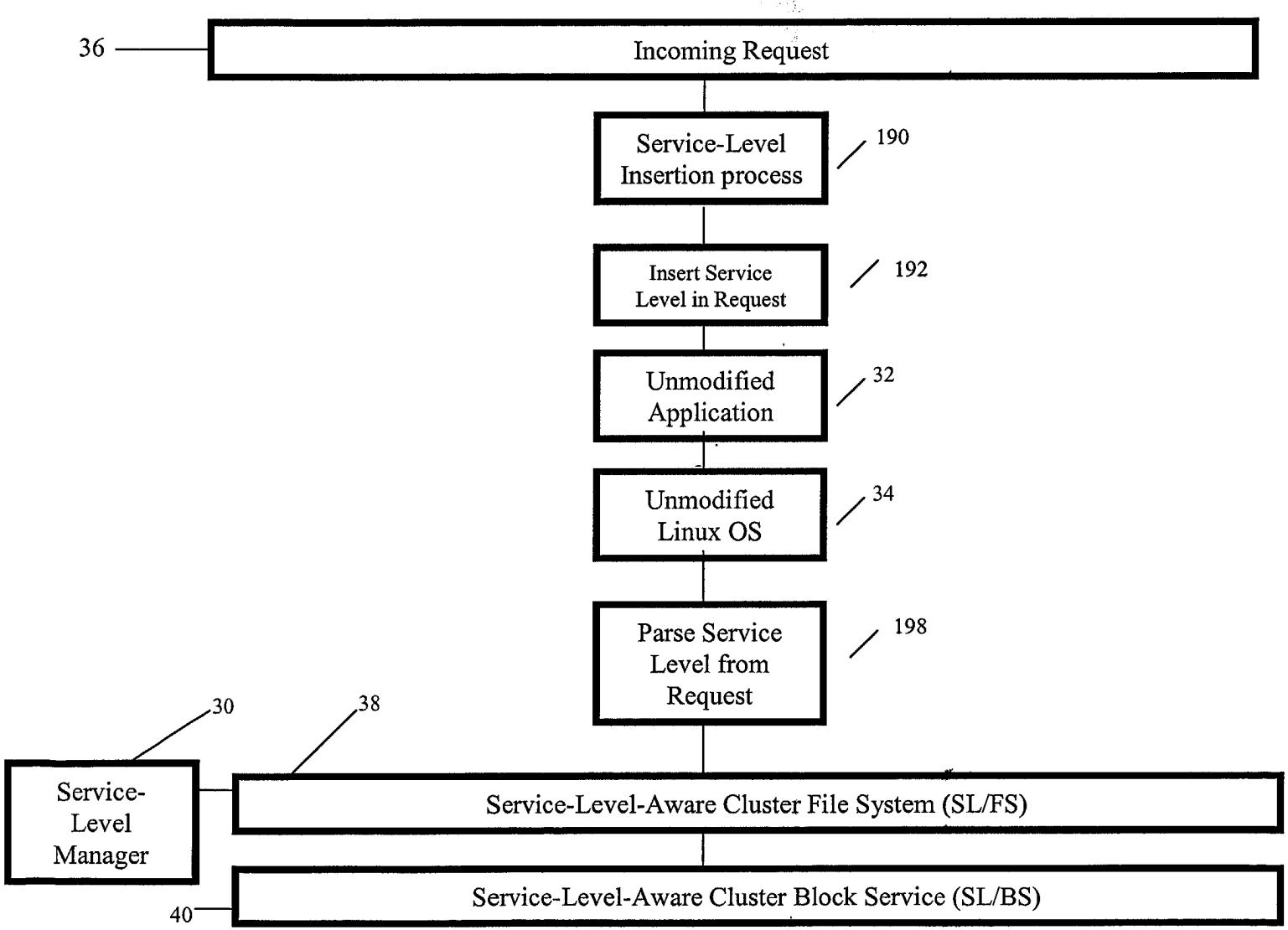

Fig. 6 – Service-Level Flow for Unmodified Applications

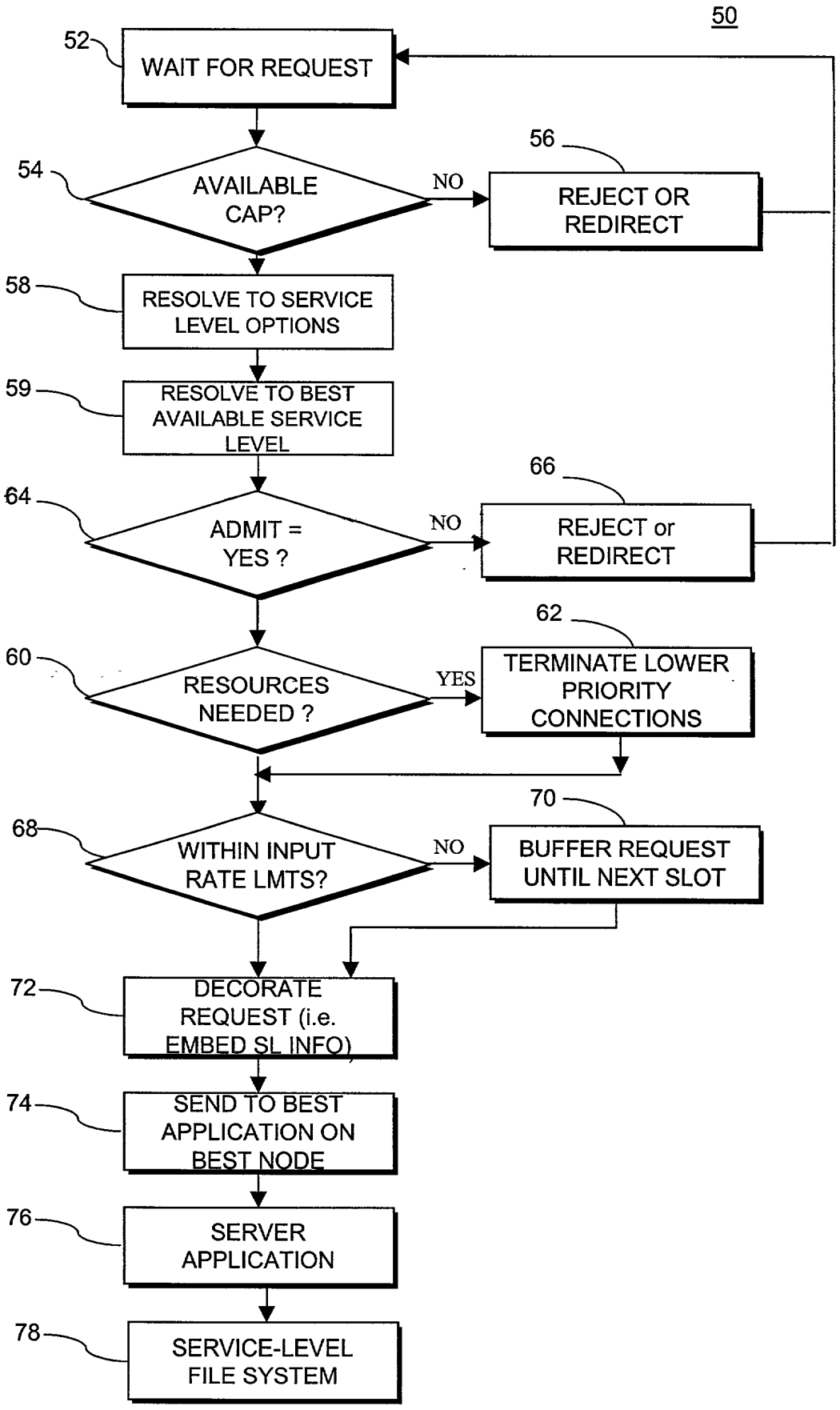

FIG. 7 – Service-Level Manager Flow

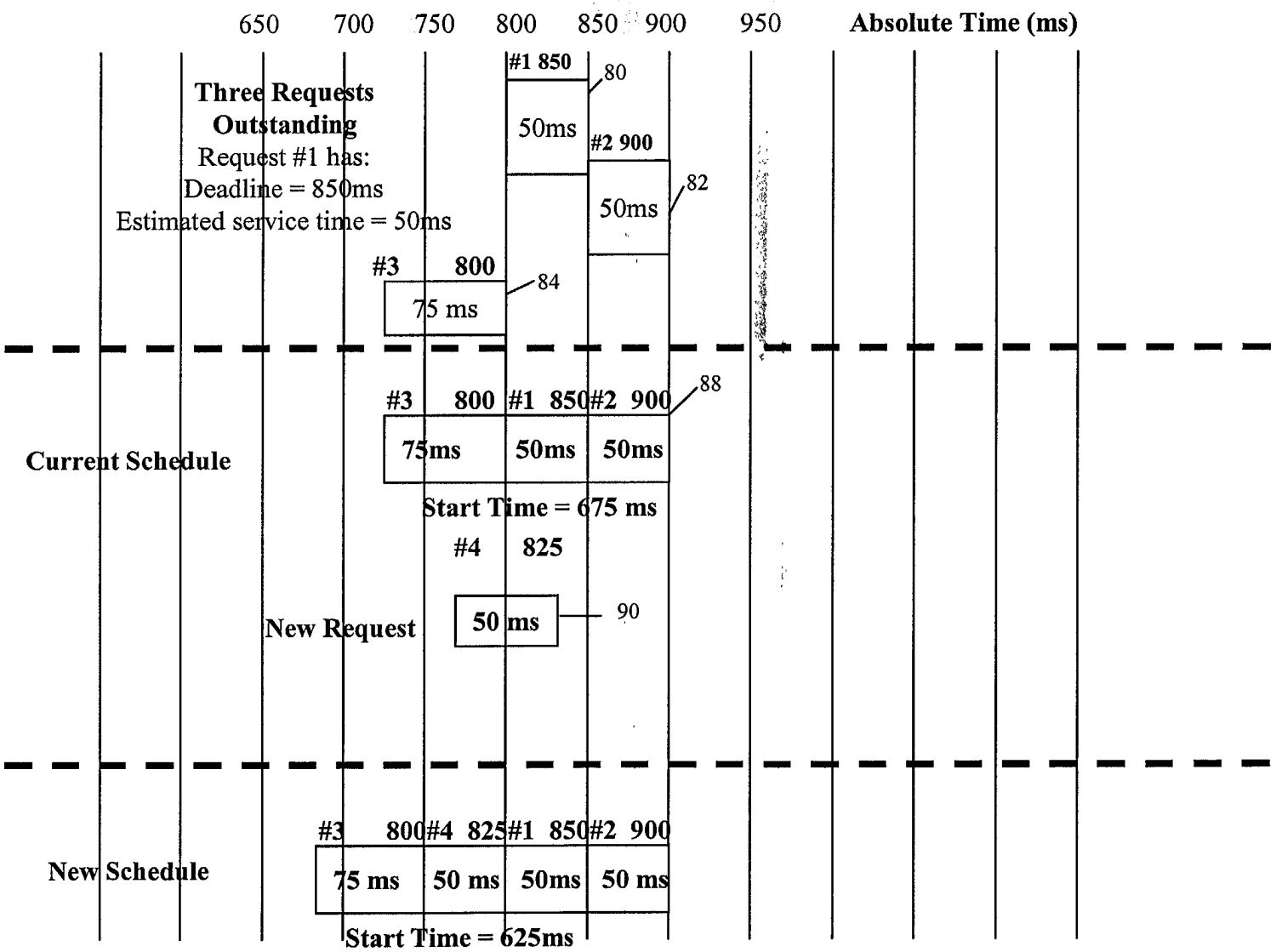

Fig. 8 - Managing a Disk Schedule with a Single Priority

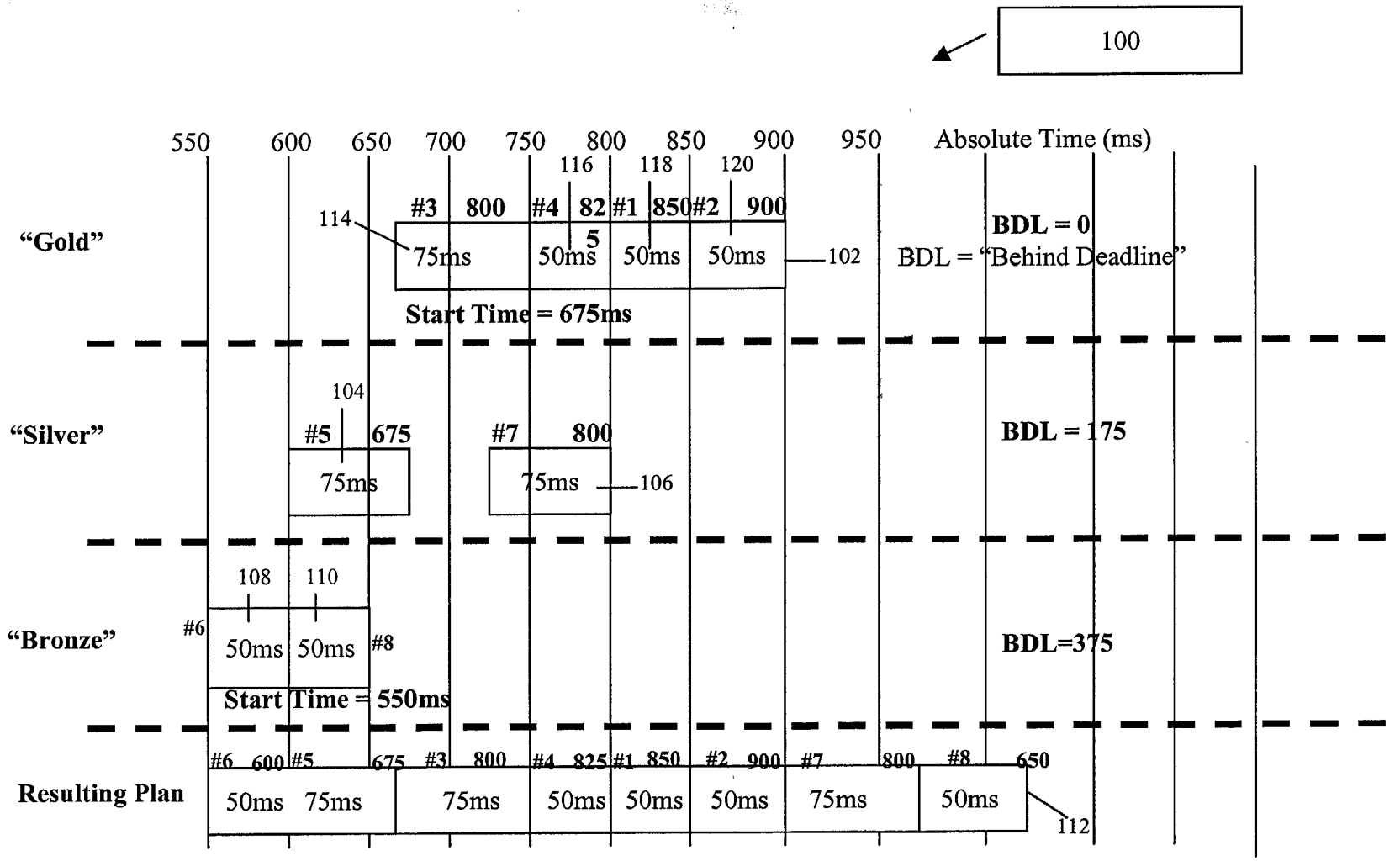

Fig. 9 - Managing a Disk Schedule with a Three Priorities

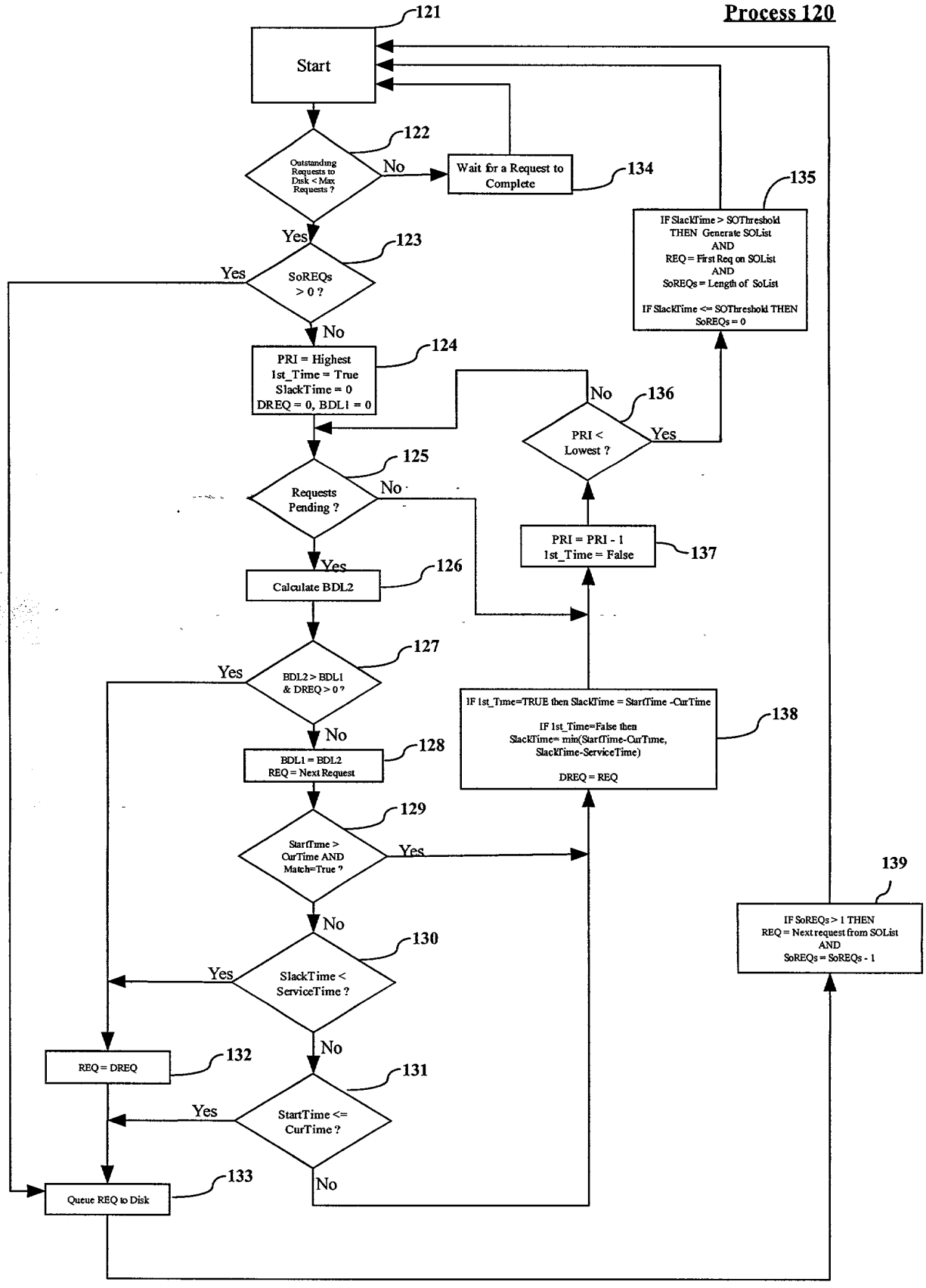

Fig. 10 – Service-Level Disk Scheduler

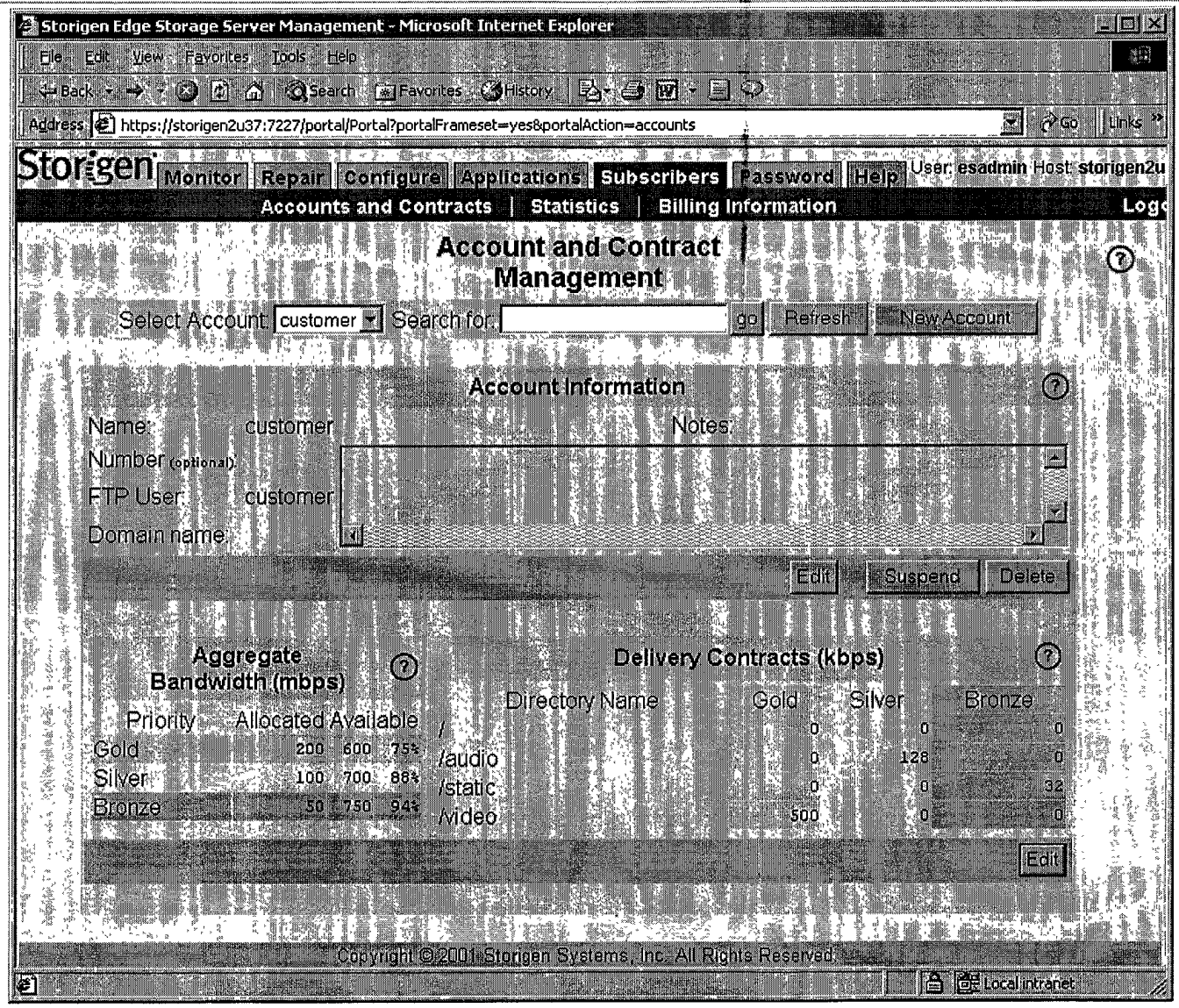

FIG. 11 – Example of Service-Level Management Interface

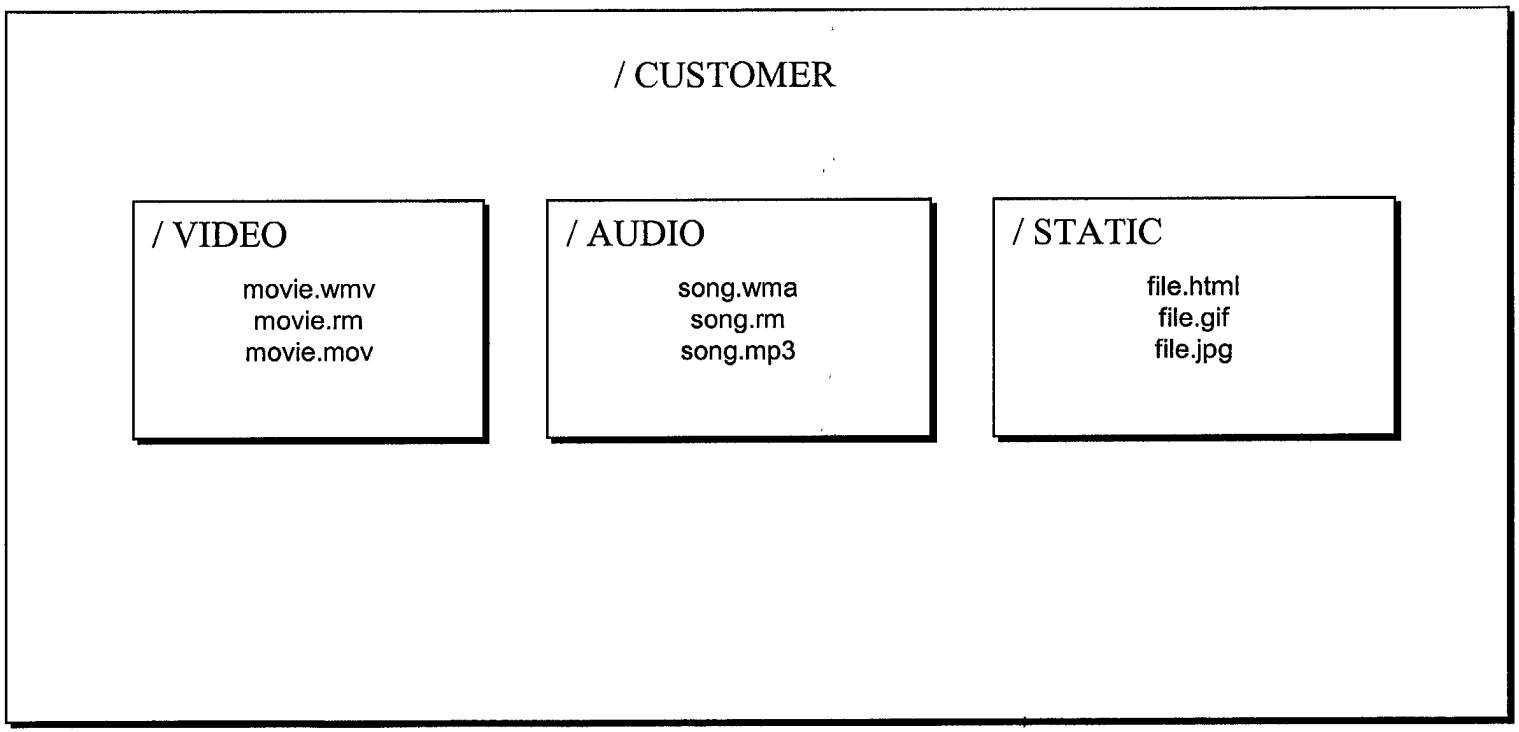

FIG. 12 – Example of Directory Hierarchy for A Customer Account

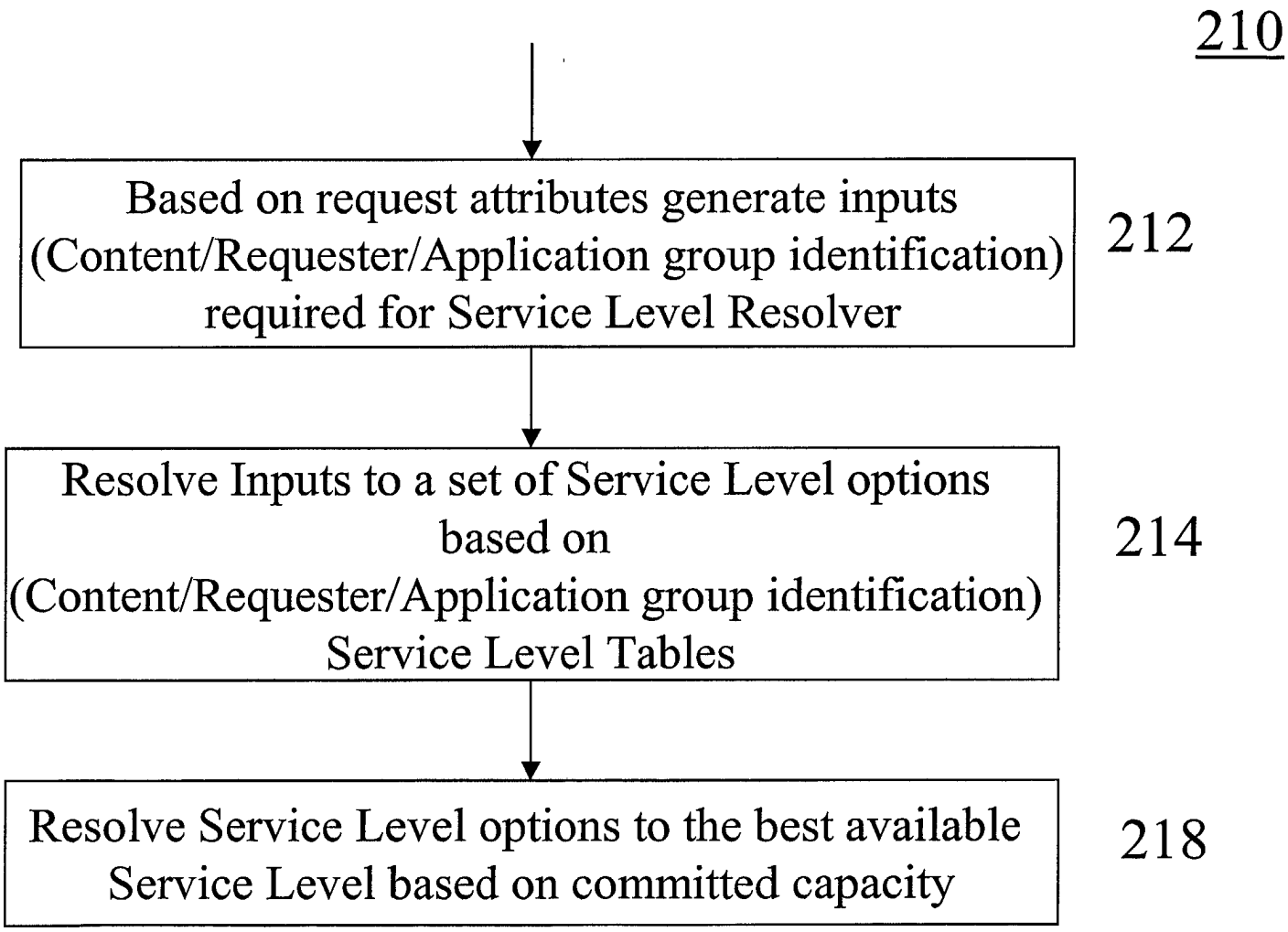

FIG. 13 – Process to Resolve Service Levels

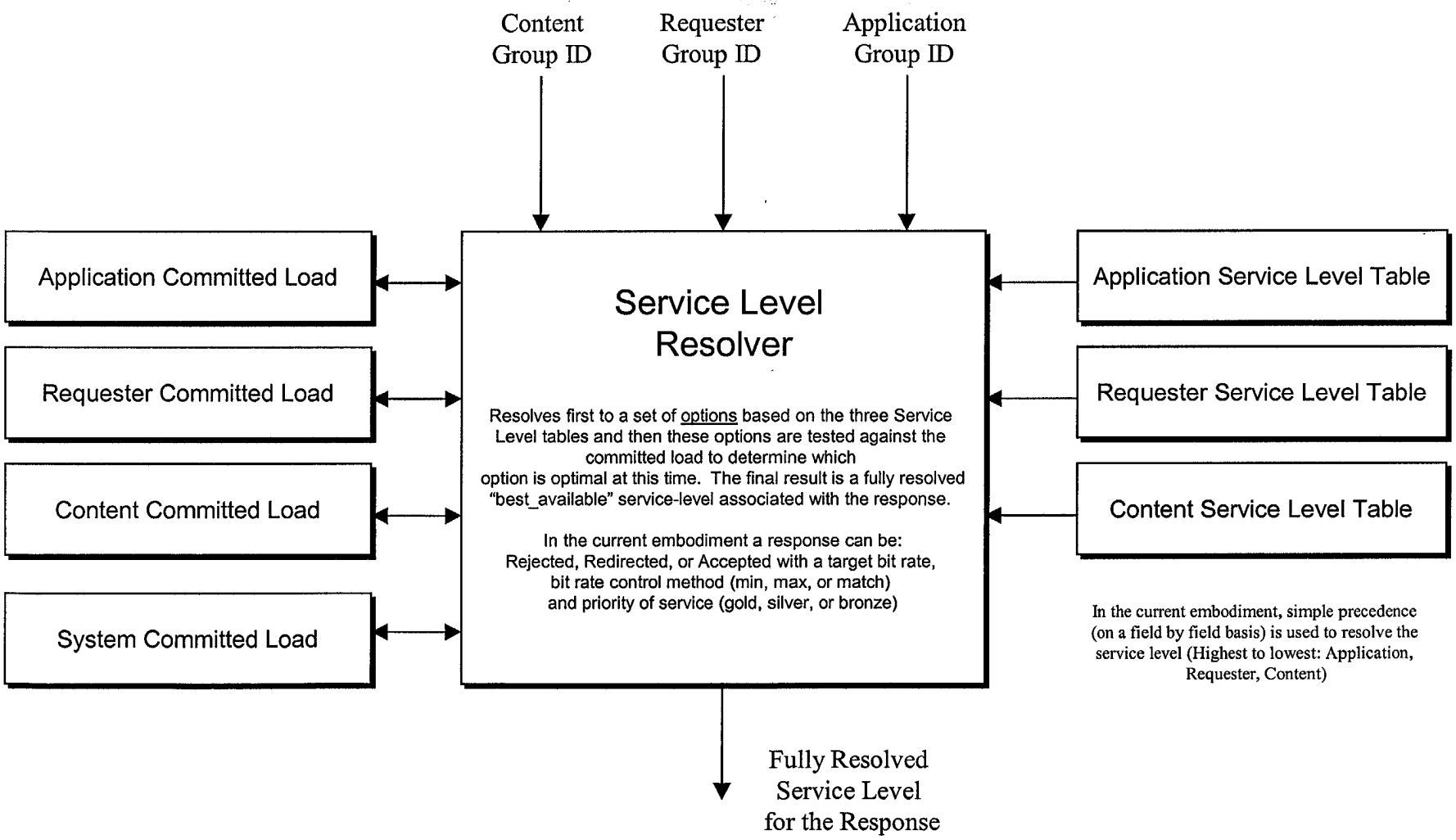

FIG. 14 - Service-Level Resolver

xGID	Priority	Aggregate Bandwidth (Mbps)	Individual Response Bit Rate (Kbps)	Bit Rate Control	On "No Admission"	URL for Redirection and Network QOS Settings
0001	GOLD	100	1.000	Min	Redirect	http://redirect1.com
0001	SILVER	100	0.500	Min	Reject	-
0001	BRONZE	200	0.100	Max	Reject	-
0002	GOLD	50	1.000	Min	Redirect	http://redirect2.com
0002	SILVER	0	0.000	Min	Reject	-
0002	BRONZE	0	0.000	Min	Reject	-

FIG. 15 - Service Level Table Structure

Priority Number (PN)	Service-level "Attribute"	"Color-based" Priority within a given Service-Level "Source"
10	Application	GOLD
9	Requester	GOLD
8	Content	GOLD
7	Application	SILVER
6	Requester	SILVER
5	Content	SILVER
4	Application	BRONZE
3	Requester	BRONZE
2	Content	BRONZE

In the current embodiment, 1 = lowest priority.
A given priority level in general is not oversubscribed, but may allocate the entire capacity of the system.
The system is over-subscribed as a result of the aggregate capacity allocated by all priority levels.

FIG. 16 - Priority Assignment Example

Application GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	-	-	-	-	-
0001	-	-	-	-	-

Requester GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	-	-	-	-	-
0001	-	-	-	-	-

Content GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0004	8	100	1.000	Min	Redirect
0004	5	50	0.500	Min	Reject

In this example, the content-based service levels comprise the response options:

Service Level Options	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
Option #1	8	100	1.000	Min	Redirect
Option #2	5	50	0.500	Min	Reject

There is more than 1Mbps spare capacity at Priority 8; therefore the response will be:

Best Available Service Level	Priority		Response Bit Rate	Bit Rate Control	Action
Option #1	8		1.000	Min	Admit

In the current embodiment, -1 in a field indicates no entry (marked '-' above)

FIG. 17 - Content-based SL Example

Application GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	-	-	-	-	-
0001	-	-	-	-	-

Requester GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	9	6	2.000	Min	Redirect
0001	6	2	0.500	Min	Reject

Content GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0004	-	-	-	-	-
0004	-	-	-	-	-

In this example, the request-based service levels comprise the response options:

Response Options	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
Option #1	9	6	2.000	Min	Redirect
Option #2	6	2	0.500	Min	Reject

In this example, there is more than 2Mbps spare capacity at Priority 9; therefore the response will be:

Resolved Response	Priority		Response Bit Rate	Bit Rate Control	Action
Option #1	9		2.000	Min	Admit

FIG. 18 - Requester-based SL Example

Application GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	10	100	1.000	Min	Redirect
0001	7	50	0.500	Min	Reject

Requester GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	-	-	-	-	-
0001	-	-	-	-	-

Content GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0004	-	-	-	-	-
0004	-	-	-	-	-

In this example, the content-based service levels comprise the response options:

Response Options	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
Option #1	10	100	1.000	Min	Redirect
Option #2	7	50	0.500	Min	Reject

There is no capacity at priority 10 for this request but there is more than 0.5 Mbps spare capacity at Priority 7; therefore the response will be:

Resolved Response	Priority		Response Bit Rate	Bit Rate Control	Action
Option #1	7		0.500	Min	Admit

FIG. 19 - Application-based SL Example

Lower Priority Application Service overrides Standard Content Service

Application GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	4	75	-	-	-
0001	-	-	-	-	-

Requester GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	-	-	-	-	-
0001	-	-	-	-	-

Content GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0004	8	100	1.000	Min	Redirect
0004	5	50	0.500	Min	Reject

In this example, the application-based service level defines the priority (it has precedence...).
Since the application-based priority is lower than the priorities of the other potential service levels, there will be only one option.
The content-based service level for the priority closest to the app-based priority defines the rest of the option:

Response Options	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
Option #1	4	75	0.500	Min	Reject
Option #2					

There is more than 0.5 Mbps spare capacity at Priority 4; therefore the response will be:

Resolved Response	Priority		Response Bit Rate	Bit Rate Control	Action
Option #1	4		0.500	Min	Admit

FIG. 20 - Application+Content-based SL Example

Premium Requester Service overrides Standard Content Service

Application GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	-	-	-	-	-
0001	-	-	-	-	-

Requester GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	9	1	-	-	-
0001	-	-	-	-	-

Content GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0004	8	100	1.000	Min	Redirect
0004	5	50	0.500	Min	Reject to www.redirect1.com

In this example, the requester-based service level defines the priority of Option#1
The content-based service level for the priority closest to the app-based priority defines the rest of Option#1:
Option 2 and 3 are taken directly from the Content Service Level entries.

Response Options	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
Option #1	9	1	1.000	Min	Reject to www.redirect1.com
Option #2	8	100	1.000	Min	Redirect
Option #3	5	50	0.500	Min	Reject to www.redirect1.com

There is 1 Mbps spare capacity at Priority 9; therefore the response will be:

Resolved Response	Priority		Response Bit Rate	Bit Rate Control	Action
Option #1	9		1.000	Min	Admit

FIG. 21 - Requester+Content-based SL Example

Bronze: 100 Users

Silver: 100 Users

Gold: 100 Users

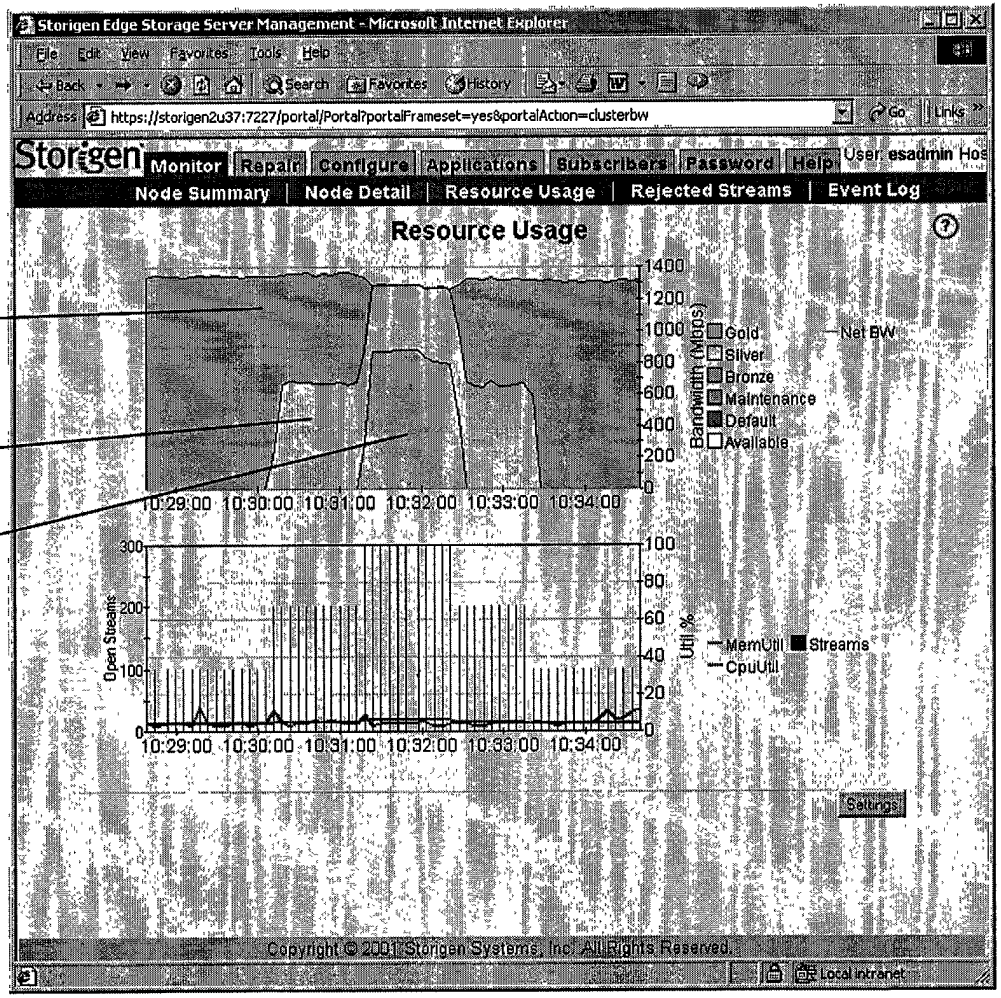

FIG. 22 – Mixed Service Level Workload